Infrastructure regulation: what works, why, and how do we know?

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CHAPTER 2

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Public infrastructure services have been subject to dramatic regulatory reform since the 1980s in the European Union, particularly privatization, at the national level, and increased liberalization and deregulation, via the Single Market Programme. Despite this ambitious reform programme, there are signs that regulation does not always work. The Commission has recognised the limitations of reform undertaken so far. Recently, it generated a list of 23 sectors which were crucial for economic growth and "malfunctioning" in the Single Market. This list included major public infrastructure services — energy, gas, telecommunications and transportation. Attempts are being made to identify the causes of this "malfunctioning" and it is expected that new regulation will be implemented to improve this situation. As part of efforts to make these markets perform better, policy-makers are turning their attention to better understand the consumer. Previously, regulation was based on the economic theory which assumed that consumers were rational and selfish. However, this is now being questioned using insights from Behavioural Economics. The Directorate General for Health and Consumers is moving towards a more eclectic approach to economics. In this light, this paper analyses regulatory reform of public infrastructure services from a user-consumer perspective. Stated (derived from the *Eurobarometer*) and

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revealed (derived from *Household Budget Survey*) preferences of consumers with respect to public services are analyzed to enable a better understanding of consumer behaviour. By contrasting stated and revealed preferences, new insights into consumer behaviour can be gained. These insights may be useful in future regulation of infrastructure services in many countries worldwide. The new evidence generated can be used as a basis for the development of new consumer or user-related regulation.

1. Introduction

Most infrastructure regulations deal with the supply-side because it is usually assumed that regulation works for consumers when competition among firms in an integrated market is being promoted. Independent Regulatory Agencies, therefore, tend to focus on providing well-functioning markets via policies to avoid market concentration, guarantee market entry and supervise licensing, use and access to networks, interconnection, prices and so on. What finally matters in the regulation of public infrastructure services, however, is the user. Despite this, knowledge about patterns of user behaviour vis-à-vis these services is often deemed of secondary importance, at best, or, at worst, ignored while designing regulatory regimes. While not using knowledge on user behaviour could constitute an important omission for any sector, it could be a particularly significant oversight in sectors which provide experience, credence or merit goods. In recent years, however, there has been an increased interest in integrating user behaviour into regulatory design and implementation. The OECD (2007, 2008 and 2009), the European Union (DG SANCO, 2008), together with the governments of Australia (Australian Government Productivity Commission 2007 and 2008), the United Kingdom (Fletcher, 2008; Vickers, 2003) and the United States (Federal Trade Commission, 2007; Mulholland, 2007), increasingly coincide that regulation which considers only the supply-side is inadequate. These governments are now paying increased attention to regulation from the demand-side as a complement to supply-side considerations. Knowledge of user satisfaction is a key means of understanding the impact of reform from the bottoms-up,

and provides insights into the dynamics of the user-service relationship. These insights may give rise to innovations in regulation, which in turn will ensure that users are informed and empowered, thus enabling competition, quality and innovation.

In the light of gaining a better understanding of the user while framing regulation, this paper evaluates public infrastructure services and their reform from the user perspective. The second section of the paper analyses how and why a common European position on evaluating infrastructure services from the demand-side was forged during the 1990s. Recent thinking in the Commission and its implications in terms of policy design, particularly its new emphasis on understanding consumer behaviour is discussed. The main tools used to evaluate infrastructure services from the demand-side are described, including an analysis of the main improvements and limitations for the better understanding of the effects of reform on users. The third section discusses the empirical analysis. In order to gain insight into user satisfaction with infrastructure services, the relevant data available is analysed with respect to Spanish consumers in the European context. It should be noted that the same methodological approach could be applied to countries around the world. This is the future intention of the authors. Particular attention is paid to issues of universality, accessibility, affordability, service use and non-use, perceived importance of the services, consumer protection and so forth from the perspective of disaggregated data on users. Because stated preferences can be difficult to compare across cultures and countries and, in order to check these declarations, patterns of expenditure on these services are analysed through the *Household Budget Surveys* (HBS). Contrasting stated and revealed preference is an innovative methodology applied to user satisfaction. Keeping in view the current approach to demand-side evaluation, the conclusions in the fourth section summarise the insights gained into the relationship between infrastructure services and users, and conclude that some of these insights could form a basis for improved demand-side regulation.[1]

[1] We acknowledge the Spanish Ministry for Science and Technology (ECO2008–06243) for financing the research. Future research will evaluate regulation using methodological presented here across all 27 Member States.

2. The Political Economy of Reforming Infrastructure Regulation

2.1. *From State to Market: Establishing Citizen Rights to Public Services*

Privatization, liberalization, deregulation and internationalization of enterprises that were previously national monopolies for several decades raise complex questions about regulation for users (Clifton, Díaz-Fuentes and Revuelta 2010). From a political economy perspective, regulatory reform shifts the old balance between winners and losers. Theoretically, consumers are set to gain from these reforms, due to expected price reductions and increases in service performance and choice, whilst labour may lose as working conditions are subject to more competition.[2] Usually, governments decide the policies they wish to implement and they choose the ones that best suit their political economy interests. An additional factor in the case of the EU is the 'Single Market,' that is prevalent eversince liberalization and deregulation policies were introduced, as well as the introduction of new regulation in certain fields; and ´"lock-in" national governments to European reform.

In the face of the dramatic reform of public services in the EU from the 1990s, the need to establish regulation from the user perspective was agreed, although there was a dispute on elements that were supposed to be regulated. After some conflict, an "European compromise" was settled between France and the UK. Whilst the French position sought to regulate the user by establishing citizen rights or entitlements at the EU level inscribed in a charter or Directive, UK remained optimistic about the capacity of the market to resolve problems, though it conceded that some small measures may be required to protect consumers. From the beginning of the 21st century, the failure of the legal project to establish a Constitution for European citizenship sounded the death knell for the continental project. Moreover, efforts were made to find economic

[2] See the outputs of the PIQUE (Privatization of Public Services and the Impact on Quality, Employment and Productivity) EC VI Framework Programme at http://www.pique.at/, Hermann *et al.* (2007).

solutions, rather than legal solutions, with regard to regulating from the user perspective. This section examines the contested development of demand-side regulation from the 1990s and explains the position reached at the beginning of the 21st century.

From the 1980s, as part of the Single Market Programme, the European authorities agreed to implement liberalization and deregulation of infrastructure services. Privatization, in contrast, was a national affair: some countries, such as the UK, had been early privatizers, though most Member States embarked on privatization programmes later on, from the 1990s (Clifton, Comín and Díaz-Fuentes, 2003, 2006). As reform deepened and extended, however, pressure accumulated from representatives of the European political elite as well as from consumer and labour organizations due to their concern with the consequences of these reforms. These concerns crystallised around the fear that if the regulatory reform of infrastructure services was left unchecked, users could experience bad service quality than they did before the reform. Member States characterised by continental legal traditions, whereby universality, accessibility and non-discrimination were inscribed as citizens' rights, as well as numerous consumers' associations, and social partners, were particularly important representatives of this position.

Public services played an important role in the historical evolution and institutional building of the EU Member States, representing a different model to that found in the United States (Galambos, 2000). One important difference was the legal system: public services were defined distinctly and occupied different places in the legal systems and Constitutions of various countries. In France, Italy and Spain, citizens enjoyed rights to public services since the 19th century. In other countries such as Germany, the Low Countries and the UK, public services had a less marked place in the legal system, but were associated with specific obligations connected to the provision of public services (for instance, accessibility, quality and continuity). Though there were differences across the EU, there were also many common features in terms of the organization, ownership, regulation and development of public service regimes. Rationales for public enterprises were similar across Europe, such as the existence of natural monopolies, the strategic nature of goods or services, and social justice. Other important similarities in public

service regimes across Europe included the kinds of activities that had been operated and managed by public enterprises, a resistance to allowing market forces to govern these activities, and the introduction of similar laws on how these services should be run (such as monopolies, concessions, exclusive or special laws). When public services had been provided by the State, citizens had a "voice" via a universal right to vote nationally and locally for a political manifesto, in which public services were always central. Politicians were accountable to citizens for public service provision. Under privatised ownership and market-driven rules, it was feared that commercial interests would be pursued over and above the public interest, which could negatively affect public service obligations, universal service, quality, price and continuity of supply, blurring who would be taken as accountable for these services (CEEP and ETUC, 2000). As firms in the communications, transportation, water and energy sectors became increasingly internationalised, fears were voiced by consumer associations and other NGOs that basic public services that were once understood to "belong" to the nation would now be owned and controlled by distant foreign interests motivated by short-term profits because of the principal-agent problem (Balanyá *et al.* 2000). Considering much internationalization was by foreign national governments, another concern was geopolitics: in Europe, the main threat was Russia's perceived energy interests (Clifton, Comín and Díaz-Fuentes, 2007; Goldstein, 2007).

As privatization and liberalization of the infrastructure services gained importance, actors — led particularly by France and Belgium — began to express their fundamental concerns. Whilst liberalization was a clearly defined policy, the nature and role of "Services of General Interest" or SGI[3] — which could be legible for state-aid and exemption from liberalization — was less clearly defined. In general, these actors were not against reform *per se.* However, they insisted whether on or not public

[3] "Services of General Interest" (SGI) is the official EU terminology for a range of public services. SGI is sub-divided into two categories: Services of General Economic Interest (including most public infrastructure services) and Services of General Interest (education, many health services, defence and so on). For a discussion, see Clifton, Comín and Díaz-Fuentes (2005), Mangenot (2005), and Louis and Rodrigues (2006).

services fell in to private or public hands, the user needed written guarantees about their rights, which should be included in a European Directive or Charter. In 1994, Jacques Delors, the President of the European Commission (EC) commissioned two of the EU social partners — the "European Centre of Enterprises with Public Participation and of Enterprises of General Economic Interest" (CEEP), and the European Trade Union Confederation (ETUC) — to draft a Charter for SGI as a basis for a Framework Directive, which was published six years later after many rounds of consultation (CEEP and ETUC, 2000, EC, 2003b, EC, 2004). This development was also championed by the European Parliament and supported by the German government (Prosser, 2005). The draft Charter urged for a "bottom-up" approach to social regulation. This draft mentioned that citizens — not users or consumers — are more important and argued that all citizens should be guaranteed rights to: equal access, no discrimination, continuously working, quality and adaptable services, universal provision, safety, fair pricing, efficiency levels that could be verified objectively, transparency, participation and democratic control. In this way, public services would be a foundation for a 'Social Europe' characterised by solidarity, territorial and social inclusion, quality of life and a dynamic economy (Van de Walle, 2006). A logical extension of guaranteeing rights to public services was the establishment of a European citizenship — part of the objective behind the failed European Constitution.

2.2. *A European Compromise: Creating "Citizen–Consumers"*

Other EU actors, particularly business lobbies and the British and Dutch governments argued that granting entitlements to citizens was unnecessary, and that liberalization should be allowed to work freely, though, as consumers, some forms of protection may need to be established. To counter the French-led proposals, they proposed a market-based one, much of which was influenced by New Public Management (Clifton, Comín and Díaz-Fuentes, 2005). While the continental position called for a charter or Directive to uphold citizens' rights, the UK and Dutch governments supported a service charter similar to those associated with New Public Management, as promoted by

governments in Australia, UK and the United States, as well as international organizations such as OECD (McGuire, 2002). Though diverse in scope and objectives, most service charters emphasize issues about consumer empowerment and performance benchmarking. New Public Management basically suggests that market mechanisms can be introduced into business where privatization is not feasible or desirable. Though the concept of New Public Management has been criticised as being over-stretched (Hood, 2001), it is often associated with techniques such as contracting out and downsizing. From the consumer perspective, users may pay for good information about service performance, levels of satisfaction, and have channels to voice their discontent (Hirschman 1970; Clifton, Comín and Díaz-Fuentes, 2005). There are several important differences between the "citizen-centred" and "consumer-centred" approaches (Clarke *et al.*, 2007), but perhaps the most fundamental one is that the "continental" perspective addresses citizens (the entire population) whilst the "Anglo-Saxon" perspective begins with the point of consumption; little is said about those who fall outside this market exchange.

As is the case with EU, a compromise was sought to satisfy opposing positions. In Communications, such as EC (2000), the Commission attempted to "merge" the two main positions by using "citizen" and "consumer" almost interchangeably. It was argued that citizen and consumer rights were two sides of the same coin: consumers must be guaranteed a set of basic obligations by service providers, enjoy the choice of supplier, receive a transparent and better service at a lower price. It was argued that citizen and consumer rights were compatible, and both helped to forge a 'Stronger Europe' in economic and social terms. Perhaps, the Commission was trying to fudge the differences, because debate grew with the publication of the Green Paper of SGI in 2003 (EC, 2003b). The Green Paper elicited responses that revealed significant differences across the EU, with British and French policymakers representing the most "extreme" positions. This Paper was concerned with whether user rights should take the form of a charter or Directive, and, if so, whether a single charter or a series of minicharters for each kind of public service would be preferable. The British opposed the establishment of a single charter, while the French

emphasised the need for a proper definition of SGI as well as a clarification that the Member States could use discretion in order to organise and fund them as required (Prosser, 2005). The resulting White Paper, published two years later, only contained "soft" instruments with regard to regulation for two main reasons: First, due to the lack of consensus about the way in which user rights to these services should be regulated, second, because overshadowing all these developments was the process whereby the European Constitutional Treaty was to come into force, granting rights to a long-awaited European citizenship. When the Constitutional Treaty was rejected and, as the EU entered an institutional crisis, the project to establish of rights to these services linked to citizenship faded away.

If, in the mid-1990s, it looked possible that a Directive could be passed that focused squarely on establishing citizens' rights to these services, it seems that the EU has quietly abandoned the aim of protecting citizens through "positive integration." Any rights to services will be guaranteed at the national level, or will be promoted by the European authorities through "soft" instruments (Clifton and Díaz-Fuentes, 2010).

2.3. *Evaluating Regulation: What do we Know, and How?*

From the 1980s, the rhetoric of reformist policy-makers centred on the ideas of augmenting choice and quality of infrastructure services for users. Paradoxically, systematic research on whether users are more satisfied after reform has not always been prioritised. Most policies have focused on supply-side concerns, and it is only more recently that attention is being paid to demand-side issues. Better information about users' opinions forms the crux this new approach.

The EC started to monitor public opinion from 1973, using standard survey techniques as a working tool in its policy-making process. Since then, special surveys which focused on specific topics were introduced — including user satisfaction with public services — as well as surveys by telephone and more qualitative approaches including the use of focus groups. Between 1997 and 2007, surveys dedicated to exploring satisfaction with public services changed in terms of the focus of the survey, the questions posed, those surveyed and the process of inclusion/exclusion of

those surveyed. For methodological reasons, the first survey, published in 1997, is not directly comparable to the proceeding ones. However, from 2000, the methodology is homogenous. Therefore, results can be directly compared.

The first dedicated survey was conducted by the *Eurobarometer* 47.1 (EC, 1997). This is different from the proceedings ones, because it focused on views of citizens in the face of the prospective exposure of public monopolies to competition. To this extent, it is the only survey of opinions about public services "before" they are subject to significant regulatory change or at a relatively early stage in regulatory reform, though regulatory change was already advanced in some Member States and relatively more advanced in telecommunications than in other public service sectors. There are two striking features of this survey (Clifton, Comín and Díaz-Fuentes, 2005): First, the 1997 survey is concerned with the opinions of "citizens" as opposed to "users" — questions focus on perceptions two citizens have about the opening of monopolies with regards to prices, access, quality, choice and consumer protection, as well as questions about what benefits they had already noticed. The influence of the continental approach is thus revealed: for instance, in the 121-page document, "citizen" is used 303 times. The other striking thing is the survey results: levels of citizen satisfaction depend heavily on 1) the country a citizen resides in and 2) the sector being evaluated.

The proceeding surveys on satisfaction are more directed at user satisfaction. Thanks to the efforts by the Commission to deploy the same methodology, the surveys from 2000 onwards are directly comparable making the evaluation of satisfaction over time possible. Each of these surveys consists of in-depth analyses of consumer satisfaction with SGI, in the EU-15 (EC, 2000; EC, 2002), the new EU-10 (EC, 2003a) and the EU-25 (EC, 2005; EC, 2007b). EC (2000), EC (2002), EC (2003a) and EC (2005) measure satisfaction with access, price, information and other contract indicators for electricity, gas, water, fixed telephony, mobile telephony, postal services, urban transport and railways. EC (2007b) covers these sectors plus internet and banking.

There is one significant methodological difference, however, which mirrors the concerns in Europe over understanding consumer behaviour. In the 2000 and 2002 surveys, "non-consumers" were screened out

of the survey results. The problem with this exclusion is that the results on satisfaction are biased as they do not include those who cannot afford them, do not have sufficient information about them, or do not want them for a variety of reasons. To a great extent, this policy reflected the influence of New Public Management's focus on the consumer. This policy was changed in the 2004 and 2006 surveys: here, the survey respondents were grouped into two categories at the outset: consumers and non-consumers of a given service. Both categories were analysed in order to gain a deeper understanding of items consumed people. Questions of access were stressed for both categories, and, once identified, non-consumers were surveyed further on issues such as accessibility, affordability-price, quality, consumer rights' protection and consumer relations. Non-consumers who potentially had service provision were asked about accessibility, affordability and knowledge of the quality and reliability of the services. In addition, for the first time, additional socio-economic variables of respondents were considered in the analysis, including gender, age, education, household composition and urbanisation. These efforts towards better understanding consumer behaviour, including the behaviour of "non-consumers" differed from the earlier attempt to study citizens' opinions. These changes reflect a better understanding of consumption patterns in the first few years of the 21st century as discussed in the fourth section.

Now, while the *Eurobarometer* provides rich statistical data on citizens' opinions and perceptions with regard to infrastructure services, they have not been used sufficiently in the design and implementation of regulatory policies until now. In addition, there has been a lack of empirical and analytical research to uncover what can be learnt about stated preferences for evaluating an infrastructure reform. One exception is a study by Clifton, Comín and Díaz-Fuentes (2005) that analysed patterns in stated user satisfaction across the EU-25 for six services based on *Eurobarometers* 1997–2004. In addition, Fiorio *et al.* (2007), Bacciochi *et al.* (2008) and Fiorio and Florio (2008) also used *Eurobarometers* to assess infrastructure reforms based on stated preferences. These three studies found that competition, but not privatization, has a positive effect on satisfaction, particularly on prices. Fiorio *et al.* (2007) highlight the complexity of the economic, social and institutional environment as a determinant of

attitudes about these services. Fiorio and Florio (2008) conclude that institutional circumstances should be borne in mind while designing regulatory policies, since it is misleading to assume that a single, homogeneous regulatory framework will have the same results in different contexts.

The objective of research based on stated preferences is to empirically analyse questions previously studied from the theoretical perspective. This justifies the need to evaluate institutional aspects and the quality of public policy, as well as the net effect in terms of winners and losers (Frey and Stutzer, 2002). However, a large literature exists which points to the biases that may arise in the expression of stated preferences. This has led to scepticism in deploying data on user satisfaction as a means of improving the design of service regulation. Stated preferences have traditionally been compared with revealed preferences (user behaviour) as an instrument to explain consumer behaviour. The utility inference derived from real consumer behaviour has been dominant, due to its ascribed objectivity, when comparing comparatively household welfare from the economic point of view. Despite this, there is a lack of research on the evaluation of regulatory reform of infrastructure services, perhaps due to a lack of homogenous data at the European level. Recently, more attention has been paid to evidence of empirical anomalies in human behaviour which that utility can be inferred from revealed preferences (Frey and Stutzer, 2002). This could imply that when regulation is evaluated from the demand-side, possible biases in user behaviour, which are crucial to the new economic approach detailed in the next section, should be taken into account. Thus, stated and revealed preferences could be considered as complementary sources, which when combined, will enrich the analysis of user behaviour.

2.4. *Implications for Designing a Regulatory Framework: New Regulatory Policies in the OECD and EU*

From the early years of the 21st century, new ideas gained importance among policy-makers in institutions such as OECD, the EU, as well as several national competition agencies such as those in Australia, United States and the United Kingdom. Just as ideas derived from New Public Management diffused by the OECD and other organizations, particularly

Anglo-Saxon governments, became influential within European authorities during the 1990s, in the first few years of the 21st Behavioural Economics was promoted by the same countries and organizations.

Using insights from psychology, behavioural economists critiqued the traditional view of *homo oeconomicus* consumers as rational, selfish and time-consistent individuals which underwrote an understanding of the act of consumption as a cost-benefit analysis resulting in the optimum choice for the individual. Though economists argued that this was a useful approximation of consumer behaviour, other economists and psychologists argued that insights from psychology based on observation could help to refine this traditional approximation. In particular, insights from Behavioural Economics tries to explain why consumers do not always take optimum decisions. For instance, behavioural economists analyse ways in which people tend to discount the future whilst overemphasising the present ("myopia"), which may led to inertia: diets always start tomorrow. In addition, Behaviour Economics argues that the way in which information is presented — or framing — can affect consumer behaviour. Experiments showed how pictures of a female associated with a product could significantly increase sales. The product information is presented with default options. Depending on whether the default option is to automatically become — or not become — a member of a pension scheme could have significant consequences for peoples' future security, it was claimed. Moreover, choice or information overload may result in consumer boredom and non-consumption, or in electing the "wrong" product. Applied insights on information presentation to the infrastructures, research have shown that, frequently, when consumers switch provider, a great proportion opt for a package that makes them worse off (EC 2007a; DG SANCO, 2008). This could be explained by lack of information, information overload and other aspects of human psychology. Kahneman (2002) explained the phenomenon of "slow learning" which occurs not because people do not learn but because of the way information is processed. Behavioural economists also studied the ways in which social aspects such as peoples' level of education, gender, residence and age can affect their consumption decisions. Applying these insights to use of infrastructure services could shed light on why citizens do not always take optimal decisions. For instance, many consumers fail to switch provider when better alternatives are available. Other behaviours

vis-à-vis infrastructure could be explained using data on the social context or their social role.

Patterns in user behaviour could be useful in explaining how markets function. Of late, it is argued that these insights could have important consequences for regulatory design. In this regard, from the practitioner perspective, one powerful suggestion is that rather than separating competition policy (supply-side) and consumer policy (demand-side) institutionally, these regulations could — and should — be combined. This is recommended by the new "Fair Trade Policy" at the UK Office of Fair Trading (Fletcher, 2008). By merging demand and supply-side regulation, aspects of consumer behaviour, such as inertia, limited memory, myopia, choice overload and so on can be addressed through better regulation.

DG SANCO argues that incorporating consumer behaviour into the design of regulatory frameworks for infrastructure could be a means of improving regulatory quality. A better understanding user behaviour as part of a demand-side consideration, combined with supply-side considerations, could be incorporated into a better, higher quality, regulatory policies. Improved regulation of these issues can make consumers and non-consumers alike more knowledgeable about products and services, thus making them more "empowered," "active" and "confident" in the marketplace (Fletcher, 2008). Improving our understanding of consumer behaviour could mean consumers benefit more from the potential advantages of competition policy. From a political point of view, it should be noted that this solution is of interest to the Commission because, while it has historic competence in competition policy, it has lesser competence and experience in consumer policy. An attempt to merge elements of consumer policy with competition policy could increase the Commission's competence in consumer policy. Because of that, particularly active in this project was the newly-established Directorate for Health and Consumers, also known as DG SANCO.

The previous approach to defending citizens' rights to public services was abandoned, whilst policy-makers turned to eclectic approaches to economics for sources of new insights into regulation. From 2006, the Commission undertook a review of the Single Market Programme in order to identify what was still not working with regard to an integrated

market. A list of 23 sectors — which were both important for the European economy and which displayed significant problems with reference to obstacles to a Single Market was identified. Unsurprisingly, all the main public — infrastructure services were included on this list. With reference to supply-side regulation, an in-depth analysis was done to quantifying characteristics such as market power, competition, prices, mark ups and so on, with the aim of reconsidering the optimum policy response (DG SANCO, 2008). However, this is also being complemented by a demand-side analysis, as the Commission, in accordance with the OECD, states that interactions between consumers and the market may exhibit problems that may not be addressed by the supply-side regulation. Thus, the Commission is seriously studying the benefits of demand-side regulation, if analysis indicates this is required.

In order to signal increased attention to understanding the consumer, a new tool known as the "Consumer Market Scoreboard" (DG SANCO, 2008) was launched in 2008. The idea was to produce a highly visible and accessible document that contains aspects such as consumer use and satisfaction with products and services across the EU on an annual basis. Since the Commission had been producing detailed surveys and reports on satisfaction with infrastructure services since 1997, the approach and data used in these surveys and reports dominated the work done so far. In order to gather similar information on user satisfaction for the other sectors, the Commission and DG SANCO have to coordinate the collection of national data on consumer satisfaction and behaviour from national authorities.

3. Exploring Patterns of Infrastructure Use

The main objective of this section is to empirically analyse consumer behaviour patterns vis-à-vis public infrastructure services. Data is derived from the *Eurobarometer* to assess the use of services and explanations for use and non-use. Stated preferences are contrasted with revealed preferences through an analysis of household expenditure patterns on these services. On the contrary, preferences constitutes an innovative way of evaluating infrastructure services from the demand-side. The main characteristics of the database sources for stated and revealed preferences are shown in Table 1. The stated preferences or citizen satisfaction with

Table 1: Comparison of data on declared satisfaction and observed patterns of consumption of selected infrastructure services in the European Union (2006)

	Declared preferences (Eurobarometer)						Revealed preferences (SHBS)					
	Electricity	Gas	Water	Fixed tel.	Mobile tel.	Internet	Electricity	Gas	Water	Fixed tel.	Mobile tel.	Internet
Sample size	1006						19435					
Level of analysis	Individuals						Households					
Main variables	Individual characteristics						Reference person characteristics					
	Marital status						Marital status					
	Education (1)						Education (1)					
	Sex						Sex					
	Status in employment						Status in employment					
	Age (1)						Age (1)					
	Nationality						Nationality					
	Area of residence											
	Household size						Household characteristics					
	Household type						Climate characteristics					
	Political ideology						Area of residence					
							Household size					
	Service satisfaction						Household type					
	Accesibility						Size of municipality					
	Affordability						Population density					
	Service importance (2)						NUTS1/NUTS2					
	Ease to compare offers (2)						Total spending					
	Consumer protection perceptions						Total income					

(*Continued*)

Table 1: (*Continued*)

	Declared preferences (Eurobarometer)						Revealed preferences (SHBS)					
	Electricity	Gas	Water	Fixed tel.	Mobile tel.	Internet	Electricity	Gas	Water	Fixed tel.	Mobile tel.	Internet
Use	93.44	61.13	91.95	81.21	73.86	35.19	98.47	56.38	95.34	82.82 (3)	67.54 (3)	31.03
Non use-related factors (4)	Age < 35 Urban area Self-employed	Rural area Age > 65 Low education	Age < 25	Age < 25 Rural area One-member households Unemployed	Age > 65 Low studies Small households	Age > 65 Low studies Rural area Small household	Age < 25 Foreigner One-member household	Rural area Age > 70 One-member household	Rural area Age < 30 Age > 70 1 or > 4-member household Low education	Age > 30 Foreigner One-member household	Age > 65 1 or 2 member household Low studies	Age > 65 Low studies Rural area One-member household
Mean analysis												

(1) Not exactly comparable
(2) Only in fixed telephony, mobile telephony and Internet
(3) 95.2 % considering jointly fixed and mobile telephony
(4) Only individual and household characteristics
Source: Authors. Information is based on EC (2006) and INE (2006).

SGI are derived from the *Eurobarometer* (EC, 2006). These are compared with revealed preferences, or consumption patterns of particular services, derived, in this case, from the *Spanish Household Budget Survey* (*Encuesta de Presupuestos Familiares* or SHBS) of the same year (INE, 2006). Clearly, this analysis could be extended to the rest of the EU using the Household Budget Survey (EUROSTAT, 2009). Both surveys include data on the use of diverse services, including, for our purposes, electricity, gas, water, fixed and mobile telephony and internet services. The Spanish survey sample is 19,435 households, while the *Eurobarometer* sample is 1,006 individuals. Socio-economic characteristics which are comparable across the two surveys are marked in bold.[4] There are other characteristics included in one survey but not in the other, such as political position (in the *Eurobarometer* but not in SHBS), or total household income (in SHBS but not in the *Eurobarometer*). Whilst the *Eurobarometer* indicates whether individuals state they use a service, SHBS reveals consumption through expenditure. Service use is revealed when the amount spent is positive.

A preliminary and an important observation is that the stated and revealed use for all six services is highly consistent. Electricity and water are universal services, fixed and mobile telephony are near-universal, whereas gas and internet are less-universal services. Revealed use is higher than the stated use for universal or near-universal services, whilst the stated use is higher than the revealed use for two less-universal ones. Therefore, the stated use and the revealed use can be calculated according to the most relevant control variables in the survey, thus identifying the most important factors explaining the non-use of services. These factors are listed by declining importance under each sector. There is also a high degree of consistency with regard to factors explaining non-use. Age appears repeatedly as a significant factor. Lower educational attainment appears to be relevant for usage of gas, mobile telephony and internet while rural areas are relevant for usage of gas, fixed phone and the internet people above 65 are less likely to use mobile telephony, internet and gas; whilst younger people are less likely to use electricity, water and fixed telephony. Rural dwellers are less likely to use gas and internet, whilst

[4] Climate considerations have also been introduced to better understand consumption patterns of electricity and gas.

people with lower educational attainment are less likely to use mobile telephony and internet.

Using information on the stated use of services, Table 2 analyses the factors that best explain the use of the six sectors. Both personal characteristics of the person surveyed, as well as their satisfaction with different aspects of service provision, are tested for their influence on service use. In order to do so, probit estimations and marginal effects of the following models are used:

$$Yi = \alpha + \beta Xi + \varepsilon \text{i} \quad (1)$$

$$Yi = \alpha + \gamma Zi + \varepsilon \text{i} \quad (2)$$

$$Yi = \alpha + \beta Xi + \gamma Zi + \varepsilon \text{i} \quad (3)$$

where:

Yi = Service use: 1 = Use, 0 = Non-use.

Xi = Personal control variables such as age, sex, educational attainment and so on, as listed in Table 2.

Zi = Control variables about the services with reference to satisfaction with accessibility, satisfaction with affordability, perception of the services as being important, perception of the service as being very important, ease with which offers can be compared and satisfaction with consumer protection.

There are some striking findings with regard to factors influencing service use. First, consistently, for all six sectors, satisfaction with accessibility is — by some margin — the leading *common* factor associated with the service use. That is, the easier users perceive access to a given service, the more chances of them using that service. The second observation only concerns the three communications services since questions about 'how important the service in question is' perceived for daily life was only asked of these, and was not a common question across all sectors. In all the three cases, the more important these sectors are perceived to be for daily life, the higher the probability of these being used. The association between importance assigned to a service and use was stronger than the association between accessibility satisfaction and use. Returning to common factors asked of all six services, the second common factor explaining use was satisfaction with price (affordability), though this was much less significant than accessibility satisfaction. More in-depth analysis is organised by sector.

Table 2: Marginal effects of significant variables in service use (2006)

Variable	Electricity Coefficient	Gas Coefficient	Water Coefficient	Fixed tel. Coefficient	Mobile tel. Coefficient	Internet Coefficient
Foreigner		−0.3067**				
Left					0.0717***	
Single						−0.1301***
Nostudies				−0.1202***		−0.0923**
Women			−0.0386*	−0.1003***		
> 65		0.1308***		−0.2171***		−0.1390***
Selfemployed		0.0394***	0.1137***	0.1341***		0.1561*
Unemployed						0.1493*
Student						0.1649**
Rural		−0.1367***		−0.1159***		−0.1843***
Householdsize		0.0533**				0.0423**
Children		−0.0886***				−0.0535**
Unipersonal		0.0344***				
Oneparent		0.3406***				
Tempjan				0.0117***		
Tempjuly		0.0214***	0.0083***		0.0099**	
Accessibility	0.4898***	0.6391***	0.4744***	0.2152***	0.3080***	0.2769***
Affordability	0.0339*	0.3466***	0.0567***	0.1106***	0.1289***	0.1648***
Important				0.3046***	0.3859***	0.2848***
Vimportant				0.1043***	0.2072***	
Easyoffer				−0.0621***		
Protection					0.0556*	

Signification: * >90 %, ** >95 %, *** >99 %

Source: Authors. Information based on EC (2006).

Reinforcing the universality of electricity and water as shown in Table 1, personal characteristics intervene only weakly in explaining usage as provision is non-discriminatory. Accessibility to electricity and water is by far the most explanation for usage (48.98% and 47.44% respectively). Affordability comes second, though it is much less important in explaining the usage (3.39 and 5.67% respectively). Gas services are available to around 60% of households. With respect to usage of electricity and water, the most satisfactory explanation for usage is accessibility (63.91%) followed by affordability (34.7%). Associations with affordability are stronger than those found in the other five sectors. Personal characteristics of the respondents also matter: one-parent families or the ones with people above 65 are more likely to use gas (34.1% and 13.08% respectively), whilst negative associations are found for foreigners (−30.7%), rural dwellers (−13.8%) and two-parent families with children (−8.86%).

Fixed telephony services cover over 80% of consumers, mobile phones cover around 70% and the internet around 30%. In all three cases, perceptions that these services are either important or very important for daily life were strongly associated with probability of usage. For fixed phones, perceptions of their being important or very important and usage reached 30.46% and 10.43% respectively; in the case of mobile telephony this was 38.59% and for the internet this was 28.48% and 20.72% respectively. For electricity, water and gas, there were strong positive links between satisfaction with accessibility and usage, though this was weaker for communications services (21.52% for fixed phones 30.8% for mobile telephony and 27.69% for internet). Satisfaction with affordability is more strongly associated with usage than with electricity and water, though not more than gas (11.06% for fixed phones, 12.89% for mobile telephony and 16.48% for internet). In contrast to water and energy, issues of satisfaction with provision and customer handling appear to play a significant role in explaining usage patterns. Satisfaction with consumer protection in the mobile sector is positively associated with use of mobile telephony (5.56%). Personal characteristics influence usage the self-employed are more likely to use mobile telephony (13.41%), fixed phones (11.37%) and internet (15.61%) communications. Students (16.49%), the self-employed (15.91%), the unemployed

(14.93%) are also more likely to use internet. Personal characteristics also affect usage in a negative way: for fixed phones, these include rural dwellers (−11.59%) and females (−3.86%); for mobile phones, these are people above 65 (−21.71%) and those with lower educational attainment (−12.02), and for the internet, rural dwellers (−18.45%), the over 65s (−13.9%), singletons (−13.01%), females (−10%) and those with lower educational attainment (−9%).

The revealed use is derived from the SHBS (INE, 2006) as shown in Table 3. Average spending on the service in question of the population is measured (G_{ij}). In addition, the variation coefficient of G_i is calculated, in order to analyse the extent to which this is homogenous. Next, the average service expenditure by household users is calculated ($G_{ij} | G_i > 0$). The relative importance of G_{ij} / G_i is calculated in relation to total household expenditure, to discount the income effect. The absolute and relative importance is finally analysed by a comparison of means, according to the control variables in the SHBS. The estimation of the factors explaining service expenditure: an Ordinary Least Squares regression is performed where the dependent variable is household expenditure on a particular service (G_{ij}) and the independent variables are regional (R_i), territorial (T_i), household type (H_i), characteristics of the bread-winner (S_i) or economic situation (E_i),

From the applied model:

$$G_{ij} = \alpha + \beta R_i + \gamma T_i + \delta H_i + \zeta S_i + \eta E_i + \varepsilon_i$$

where i = representative person and j = the service in question.
It is derived:

β, indicates regional differences in expenditure
γ, indicates differences related to territorial accessibility
δ, indicates differences according to household characteristics
ζ, indicates the effects due to characteristics of the bread-winner. These include: age, non-monetary effects of employment, non-monetary effects of education, etc.
η, indicates the effect of income, associated with levels of spending (G_i) and/or total income.

Electricity represents an important part of household expenditure. Because spending is largely homogenous, there are large differences in the

Table 3a: Estimations of effects on revealed spending

	Electricity	Gas	Water
Importance (average spending)	377.47	326.59	135.87
Spending CV	0.47	0.96	1.41
Average spending (users)	383.34	326.59	135.87
Regression results	β stand.	β stand.	β stand.
Income			
TOTAL SPENDING	0.464***	0.212***	0.375***
TOTAL INCOME			–0.017**
Sex		0.015**	
WOMEN RP			
Age			
AGE RP	0.028***	–0.026***	0.067***
RP < 25	–0.011***		
RP < 30		–0.033***	
Marital status			0.015**
SINGLE			
Nationality			
FOREIGN-RP	0.055***	0.025***	0.151***
EU-RP	0.027***	0.020***	–0.015**
Education			
Employment			
UNEMP-RP	0.013**		
SELFEMP-RP	0.033***		
Household type			
SIZE	0.052***	0.014**	0.039***
5MEMBERS	–0.026***		–0.013*
ONEPARENT	–0.017***		–0.012**
WOMAN > 65	0.029***		
TWO > 65		0.018**	–0.017***
Territorial	0.043***		
variables	0.032***	–0.028***	
SEMIPOB			
SCPOB			0.024***
URBANLUX		–0.030***	0.028***
URBANHIGH			–0.013*

(*Continued*)

Table 3a: (*Continued*)

	Electricity	Gas	Water
RURAL			–0.016***
MUN50000			–0.035***
MUN20000			–0.029***
MUN10000			
MUN > 10000			–0.061***
Regional variables			
NOREAST	–0.040***		
CATALONIA	0.133***	0.171***	0.261***
CVALENC	0.131***		0.092***
MADRID	0.168***	0.247***	0.225***
ANDALUCIA	0.177***		0.152***
CANARIAS	0.113***		
BALEARIC ISLANDS			0.045***
EXTREMADURA			0.032***
CLAMANCHA			0.023***
MURCIA			0.062***
TEMPJAN		–0.076***	

Source: Authors information based on INE (2006).
RP = Reference person.
Signification: * >90 %, ** >95 %, *** >99 %.

relative ease of purchasing electricity due to income differences. Despite this, stated affordability was not very strongly linked with usage (as shown in Table 2) because demand is inelastic. Higher expenditure is associated with dwellers of less densely populated zones, foreigners, the unemployed and self-employed, and the older a person the more the expenses on electricity. One-parent families spend less on electricity. It also appears that expenses on electricity is higher in large cities that experience hot temperatures during the summer.

Expenditure on water is much lower than on electricity and is therefore quite affordable as demand is price inelastic. Variations in expenditure, however, are high due to differences in price and consumption patterns. Human geography is important as rural dwellers consume less than those in urban zones. Communities in the south and east spend more. Similar to expenses on electricity, increase in age and being a foreigner

Table 3b: Estimations of effects on revealed spending

	Fixed telephony	Mobile telephony	Total telephony	Internet
Importance (average spending)	240.23	350.62	590.85	77.85
Spending CV	1.17	1.96		2.52
Average spending (users)	290.12	519.13	620.69	250.89
Regression results	β stand.	β stand.	β stand.	β stand.
Income				
TOTALSPENDING	0.321***	0.427***	0.480***	0.291***
TOTALINCOME		0.033***	0.024***	0.018**
Sex				
WOMENRP	0.022***	0.028***	0.026***	
Age				
AGE-RP	0.131***	−0.078***		−0.024**
RP < 25				−0.017**
RP < 30	−0.041***			
RP < 35		0.041***	0.039***	
Marital status				
SINGLE		0.020***	0.017***	
Nationality				
FOREIGN-RP	−0.027***	0.102***	0.081***	−0.018**
EU-RP	0.081***	−0.042***	−0.011*	0.039***
Education				
SECONDARY				0.018***
PREUNIV	0.022***	−0.012**		0.054***
PROFEDUC		−0.023***	−0.013**	0.037***
UNIV1	0.019***	−0.024***	−0.012*	0.053***
UNIV2&3	0.030***	−0.049***	−0.028***	0.081***
Employment				
LESS2OCC		−0.027***	−0.020***	−0.026***
NONOCC			−0.030***	
SELFEMPRP	0.029***		0.016***	
Household type				
SIZE	0.042***	0.073***	0.064***	0.070***
ONEMEMBER		0.048***	0.028***	0.025**
5MEMBERS	−0.023***			−0.037***
ONEPARENT	−0.015**			
WOMAN> 65	0.030***	0.031***		0.018**
TWO> 65				−0.025***

(*Continued*)

Table 3b: (*Continued*)

	Fixed telephony	Mobile telephony	Total telephony	Internet
Territorial variables				
SEMIPOB				–0.039***
SCPOB	–0.037***	0.020***		–0.058***
RURAL	–0.014**			
Regional variables				
CATALONIA	0.186***	0.026***	0.090***	0.099***
CVALENC	0.067***		0.031***	
MADRID	0.207***	0.035***	0.105***	0.062***
ANDALUCIA	0.132***	0.044***	0.088***	
CANARIAS		0.031***	0.031***	

Source: Authors information based on INE (2006).
RP = Reference person
Signification: * >90 %, ** >95 %, *** >99 %

are associated with greater expenditure, whilst one-parent families are associated with less expenses on water. Water services may be granted for free in some rural areas with abundant water resources, particularly in northern Spain. Smaller municipalities are associated with lower levels of expenditure on water.

Gas is a considerable expense for those households which use it. Expenditure is negative for households in rural and less populated areas, and older people. While expenditure on electricity increases during the summers, expenditure increases during the winters (TEMPJAN). Households in Madrid and Catalonia spend more perhaps because networks are established in these large urban areas (as will also be seen for the internet).

Fixed phones represent an intermediate expenditure between electricity and water, and variation is important. In contrast, expenditure on mobile telephony is very high: mobile phone-user households spend more on mobile telephony than any other similar services, though there is a large variation. In order to study consumer behaviour in depth, expenditure on fixed and mobile telephony are analysed both individually and in tandem with each other. There are some interesting non-monetary effects

of education, as expenditure on voice telephony is inversely related to education: the higher the level of education received, the less the expenses. Moreover, the highly educated spend relatively more on fixed phones and relatively less on mobile phones. Likewise, the older the person, the more likely he/she will spend more on fixed phones and less on mobile phones. In contrast, younger users spend more on mobile telephony, often, as a substitute for fixed phones. Rural households also substitute fixed phones for mobile telephony. Foreigners also spend more on mobile telephony rather than on fixed phones, though EU foreigners are an exception to this. Singletons spend relatively more on mobile telephony. One-parent households also spend relatively less on fixed phones. Self-employed spend more on fixed phones. The social history of telecommunications shows that women tend to spend more on this service compared to men.

Users' expenditure on internet services is intermediate when compared to the other services and the variations are much higher than other sectors. There is a clear, positive, relationship between level of education attainment and internet use. Households with more educated members spend relatively less on voice telephony but more on the internet. Rural dwellers spend relatively less as do households with less than two jobs. Increased age is associated negatively with expenditure on the internet. Non-EU foreigners spend less on internet and EU nationals spend more (a pattern reinforced by their expenditure patterns on fixed phones).

4. Discussion and Conclusions

Measuring Regulatory Outcomes and Effectiveness: What do we know?

Mainstream approaches to the regulation of public infrastructure services which gained importance from the 1980s, such as New Public Management, promoted a consumer-centred policy design and evaluation. And yet, for all the discussions of consumers, consumer and citizen satisfaction with these services was only marginalised while designing regulatory policies. Little was, therefore, known about the effectiveness of these reforms from the citizen/consumer perspective. In the light of increased attention to supply-side considerations, as evidenced, for instance, in the importance assigned to insights from Behavioural

Economics in policy-making, there is increased interest among international organizations such as the EU, the OECD and national governments in combining supply-side with demand-side regulation.

This chapter sought to examine the demand-side for a better regulation. Contrasting stated and declared preferences shows that both sources can be complementary, and their combination can provide a better understanding of user behaviour. When analyzed individually, stated and revealed preference-based analysis has limitations. A combined analysis of stated and revealed preferences adopts an innovative approach which helps to partially overcome these limitations. At the same time, information problems which occur in the policy-making process can be partially improved adopting this approach. It is often these informational problems which affect the efficient functioning of the market with respect to infrastructure services. It is important to have a better understanding of consumer behaviour so as to improve regulation during the design and implementation stages. It should also promote increasing consumer confidence to take advantage of the potential benefits that arise due to competition and liberalization. The empirical work here focused on Spain in the context of the reform of EU-wide regulatory policies. This analysis is part of a wider research project and focused on the evaluation of regulatory reform in different countries and regions.

Implications for Regulatory Design: Effectiveness and Operation

Results obtained underline the importance of evaluating regulatory reform of infrastructure services from the demand-side with a better understanding of consumer satisfaction and behaviour. Analysis based on stated preferences (*Eurobarometers*) shows that the most used services are electricity and water, followed by fixed phone and mobile telephony. Gas and internet are lesser used services. In addition, variables related to service perception are the main factors explaining service use. The main factor is accessibility and, in the case of telecommunication services, it is perceived importance. Another relevant factor for all services is affordability, although this has a lower incidence. Factors related to personal characteristics have a limited incidence on use: while some factors are relevant explaining use of some of the services, none are significant in all cases.

Contrasting stated and revealed preferences reveals that both gas and internet are services that exhibit territorial accessibility problems. This problem does not exist in the case of water, since its lower cost is the explanatory factor for the lower spending in rural areas. Territorial accessibility is not a key aspect either in telephony services, as mobile phones increasingly substitute for fixed phone use and expenditure.

Revealed preference-based analysis shows relevant effects of individual related characteristics on expenditure on the universal services such as electricity and water. In general, a positive relation is observed between being a foreigner and expenditure on electricity and water, on the one hand, and between age and expenditure on water, on the other. In contrast, one-parent families are associated with lower expenditure on electricity and water. In telecommunications, where the possibility of choice is greater, fixed phone expenditure is directly related to age. This holds even when mobile telephony expenditure is included as an explanatory variable. Additional expenditure ranging between 2.4 and 2.6 Euros for each additional year is estimated. This age-related effect is greater in telecommunications than in the other services. Moreover, the *Eurobarometer* data shows that the older a person is, the more likely he/she will exhibit a passive attitude towards telecommunications and experiences difficulty when comparing different offers between telecommunications firms. In addition, when fixed and mobile phones are considered in tandem with each other, an inverse relation is observed between expenditure and educational attainment. Annual savings in telecommunications are estimated at 33 Euros for people that have received Further Education. This increases to 36 Euros for graduates and to 77 Euros for those studying advanced graduate studies. Educational attainment is not a relevant variable when explaining expenditure on services where there is less choice (electricity, water and gas). Moreover, the *Eurobarometer* data shows that individuals with lower educational attainments claim they have greater difficulties when comparing different options available among telecommunications firms. They also state that in the case of mobile telephony, a more passive attitude towards the service, lower satisfaction with contract conditions and lower perception of consumer interest protection.

The importance of analysing and understanding consumer behaviour and its relation to individual and environmental variables is reinforced

with other effects estimated. First, inertia is important, through personal-related variables, explaining the use of substitutive services as fixed and mobile phones. Secondly, a family support effect is observed — there is less expenditure in households with a younger reference person — in the context of a Latino-Mediterranean Welfare State (Guillén and Álvarez 2004). Last but not least, the incidence of personal attributes such as employment or marital status on individual preferences is observed, reflected in expenditure on some services. The results obtained show a relationship between expenditure and certain personal-related variables. Many of these patterns are consistent with those derived from stated preferences. These results show how psychological and socio-economic elements affect consumer behaviour vis-à-vis infrastructure services. This reinforces the argument that better understanding the consumer from this perspective can improve regulatory quality.

Lessons for Regulators: What Works, What doesn't?

Analysis of the development of infrastructure regulation over time, and the presentation of results after examining revealed and stated preferences support the argument that regulators would do well to design and implement policies jointly based on competition policies (the supply-side perspective) in addition to consumer policies (the demand-side perspective). Improved regulation, as a result of better understanding consumers, may help consumers in benefitting more from the potential advantages of liberalization and competition of services. Ideally, better regulation should diminish cases where citizens do not take the optimal decision when consuming these services, such as inertia to switch.

This paper has confirmed that homogeneous consumers do not exist. So, clearly, regulatory policies could have heterogeneous effects depending on the characteristics of the consumer in question. Estimated effects and recommendations derived from them should not be applied in the same way across all the services analysed here, though several common patterns are observed. Instead, regulators would do well to consider which of the findings from an analysis of the demand-side would best translate into an improvement in the quality of regulation. Interestingly, certain private firms have been aware of the fact that consumers are not homogenous,

and are affected by the social context surrounding them. Some fixed phone providers has begun to offer special discounts to particular groups such as the unemployed or foreigners. Spanish Telefónica has a tariff called "We Help You," while Vodafone in Italy has a reduced tariff for foreigners. Clearly, these tariffs are not altruistic. Rather, they implement price discrimination in order to avoid losing customers, particularly in the prevailing times of crisis. In contrast, policy-makers are slow to implement new regulatory policies based on concepts such as consumer heterogeneity and behavioural dimensions. Indeed, the current crisis only emphasises the importance of consumer's social and economic situation, which when understood dynamically, can affect consumption patterns. Regulators should move more quickly, with different objectives to firms, to address issues of service consumption from the demand-side in order to improve regulatory quality and service consumption.

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